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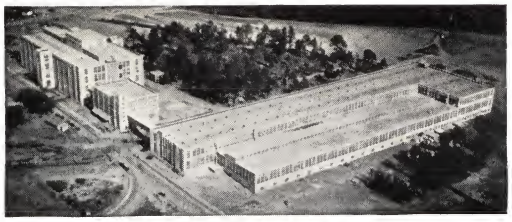
BARNES & JONES

Systems of VAPOR VACUUM HEATING

B&J

BARNES & JONES INC.



Pacific Mills, Lyman, S. C.
Architects and Engineers—Lockwood, Greene and Co., Inc., Boston, Mass. Heating Contractors—Holyoke Valve & Hydrant Co., Holyoke, Mass., and Carrier Engineering Corp., Newark, N. J.

University of Pennsylvania Dormitories, Philadelphia, Pa.
Architects—Stewardson & Page, Philadelphia, Pa.

BARNES & JONES - - -

Designed by Manufacturers for Over Thirty Years of Apparatus for Accurately Controlling Vapor and Vacuum Heating Systems

Barnes & Jones' recognized success in providing adequate economical heating for all types of buildings is based on comprehensive experience with architects, heating engineers, building superintendents, plant engineers and owners. This fact is proved not only by the quality of the equipment itself, the carefully selected materials, and precision methods of manufacture, but also in the large number of notable installations and the many leading architects who continue to use Barnes & Jones' systems.

All Appliances Are Designed, Manufactured and Tested in Our Plant

Because the lowest final heating cost can be had only with the finest possible heating apparatus, Barnes & Jones manufactures only one quality of equipment—quality that assures long term, maintenance-free operation, quality that is never sacrificed. To protect users of Barnes & Jones equipment, to eliminate complaints and unnecessary servicing—every single piece of apparatus is tested and calibrated under actual working conditions before leaving the factory.

Complete Systems of Vapor Heating for All Types of Buildings

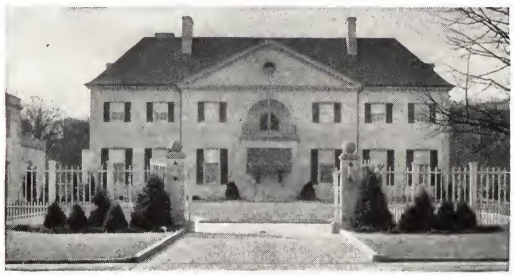
Barnes & Jones systems have been installed in modest homes, elaborate residences, office buildings, hospitals, schools, churches, theatres, industrial plants, hotels, public and semi-public buildings—proof of their ability to meet a wide range of exacting requirements accurately.

Facts to Consider Before Specifying a Heating System

The factors that make for lasting satisfaction and economy in a heating system are briefly as follows:

(1) Positive circulation of heat to every part of the apparatus, and immediate response to individual heating requirements.
(2) Partial or complete heating of individual radiators as needed.
(3) Freedom from water hammer in both radiators and piping.
(4) Elimination of air valves from radiators.
(5) Simple, accurate control by a supply valve of the heat in each radiator. Only one valve to operate.
(6) Economical operation.

When these factors are overlooked in favor of low initial cost, the result is a dollar and cents penalty that accumulates for as long as the system is in operation.



Japanese Embassy, Washington, D. C.
Architects—Delano and Aldrich, New York, N. Y. Heating Engineers—Alfred J. Offner, New York, N. Y. Heating Contractors—Standard Engineering, Washington, D. C.

Park Square Building, Boston, Mass.
Architects and Engineers—Densmore, LeClear & Robbins, Boston, Mass. General Contractors—W. A. and H. A. Root, Boston, Mass.

LEADING ARCHITECTS WHO HAVE SPECIFIED BARNES & JONES SYSTEMS

B. G. Goodhue Associates
Warren & Wetmore
Allen, Collens & Willis
Parker, Thomas & Rice
Coolidge, Shepley, Bulfinch & Abbott
Walker & Gillette
Delano & Aldrich
Shepard & Stearns
York & Sawyer
Jens Frederick Larson
Max H. Westhoff
Wm. T. Aldrich
Albert Kahn, Inc.
Cram & Ferguson
Crow, Lewis & Wick
Dwight James Baum
John Russell Pope

BARNES & JONES INCORPORATED

128 BROOKSIDE AVE. ● JAMAICA PLAIN, BOSTON, MASS.

REPRESENTATIVES IN PRINCIPAL CITIES

- - SYSTEMS FOR VAPOR AND VACUUM HEATING

Operating Principle of Barnes & Jones Vapor Heating

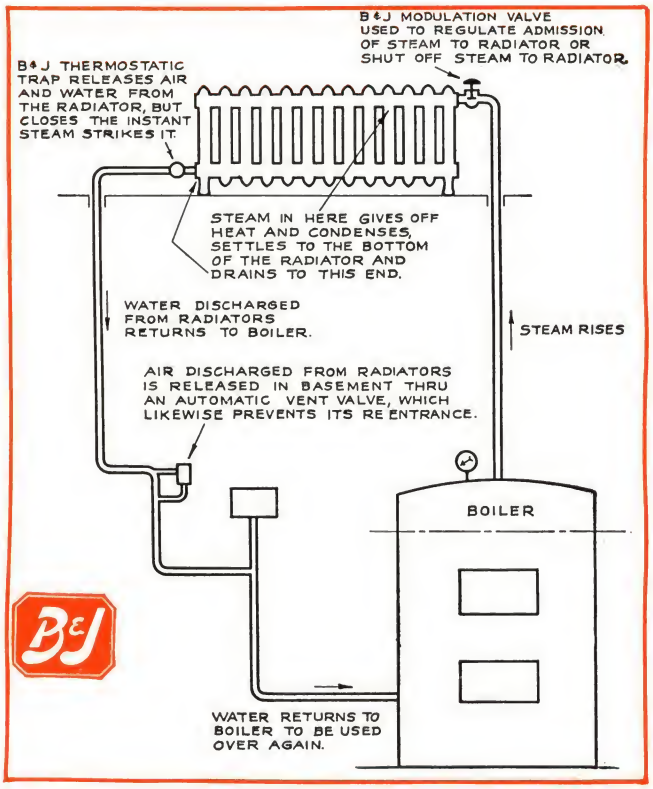
With the Barnes & Jones system of vapor heating, the return side of the system is vented to the atmosphere, with provisions made to prevent the readmission of air. This means that the return side at all times is never above atmospheric pressure, and at times a partial vacuum exists. If, for example, there is a gage pressure of only a few ounces in the boiler, it creates a definite, positive tendency to establish a circulation from the supply to the return side of the system.

Thus the steam entering the piping cannot build up a back pressure in the system to slow down its passage into the radiators.

Moreover, operating on a small pressure differential, the system provides practically instant response to heating requirements in all parts of the building. Simple and positive control of heat at each radiator is afforded by modulation valves. Thermostatic return traps prevent the passage of steam until it has given up its heat and condensed. Air and condensate are passed freely, from the radiators to the return piping, the water returning by gravity to the boiler, the air being vented in the basement.

Correctly proportioned orifices on each radiator are furnished when desired to assure uniform distribution of heat to all parts of the system.

Thus the last radiators on the line heat up as rapidly as those nearest the boiler. Steam is distributed according to actual needs minimizing waste—eliminating complaints.



FUNCTION OF THE APPARATUS

In brief, the operation of Barnes & Jones heating systems depends upon the following items:

Modulation Valves—permit control of heat at each radiator according to actual needs.

Orifices—when furnished with modulation valves insure uniform steam distribution throughout the system.

Thermostatic Traps—allow free discharge of air and water of condensation from radiators but prevent passage of steam.

Thermostatic Drip Traps or blast traps—allow removal of air and condensate from the supply main.

Vent Trap—installed at the end of return main, vents to the atmosphere the air discharged from radiators into the return side of the system, and prevents readmission of air to the system, thus, at times, establishing a vacuum on the entire system.

Condensator—insures positive return of water of condensation to boiler under varying pressure conditions. Pressure or vacuum on the system is indicated by a compound gage.

ADVANTAGES OF THE B & J VAPOR SYSTEMS

Quick Response to Heating Requirements

Because of the absence of back pressure on the return side of the system, steam is delivered to the radiators more rapidly than is possible with other types of steam systems, thus permitting a quicker response to heating needs. Steam passes into the radiators just as soon as a few ounces pressure is created in the boiler.

Noise-free Circulation

Water hammer is completely eliminated because at no time does steam come in contact with water in the piping. Condensate from radiators does not drain back into the supply lines, and thermostatic traps prevent the admission of steam to the return side of the system. Absence of air valves prevents the danger of discharging steam or water on rugs, floors, draperies, or furniture.

Economy of Operation

Since the system permits extremely rapid and efficient response to heating needs, fuel consumption can at all times be kept in close adjustment with actual requirements. This practically eliminates overheating and reduces fuel wastage.

Balanced Distribution

In all types of heating systems there is a tendency for the first radiators on the line to heat quickly, and for the last radiators on the line to heat slowly. With properly proportioned orifices in the radiator supply valves of a Barnes & Jones system, the heat is evenly distributed and balanced throughout the building—the last radiators on the line will heat equally as fast as the first.

Adaptability to Air Conditioning

Barnes & Jones Systems are well adapted for use in conjunction with air conditioning equipment, where steam is used as the heating medium. These systems provide a sound basis of economical heating and are recommended for use on those installations where air conditioning is used in combination with direct or convector radiation. In many cases a much more satisfactory result is obtained than is possible with many of the so-called air conditioning systems.

B&J Lever Handle Modulation Valve

B&J Wheel Handle Modulation Valve

BARNES & JONES TYPE "K"
MODULATION VALVES

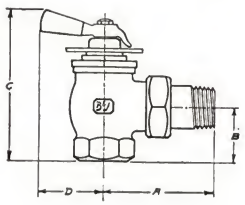
and Type "F" Packless Quick-Opening Valves

The Type "K" modulation valve regulates the admission of steam to the radiator. The valve as shown has easy-to-read graduations on a large non-tarnishable dial. The valve can be completely opened or closed in less than a full revolution of the handle. Can also be furnished in lock shield model, or with wheel handle and indicating dial, or for chain operation.

The Type "F" packless valve is recommended for use in residences, public and semi-public buildings where a moderate priced quick opening valve is required. Less than one complete turn of the handle will open or close the valve. This feature plus the advantages of the permanently packed stem and renewable disc seat have resulted in the use of the Type "F" in many industrial plants.

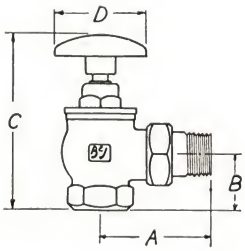
Both the Type "K" and Type "F" have large unobstructed passages to prevent trouble from scale and dirt, and when the valves are fully opened, they have a free area practically equal to that of the connecting pipe. The valve bodies are constructed of the best composition steam metal, heavily nickel-plated.

Send for Bulletin giving dimensions and more complete description.



TYPE K MODULATION VALVES

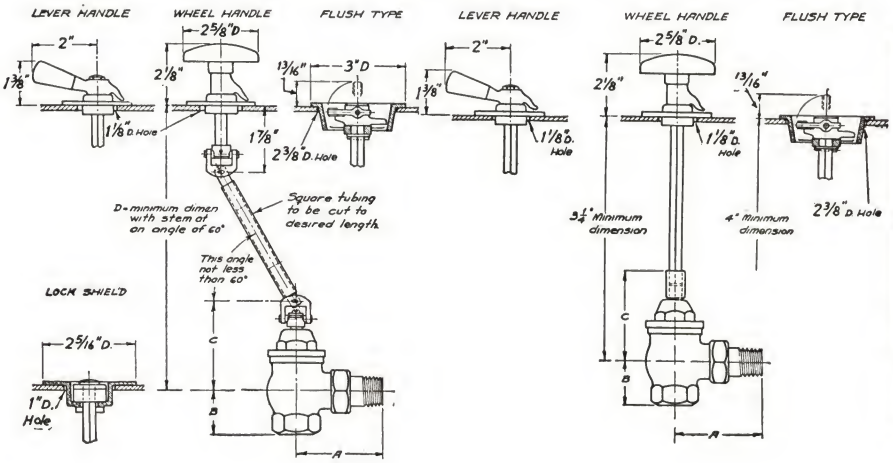
SIZE	Capacity Sq. Ft. C.I. Rad.	A	B	C	D
1/2"	30	2 3/4	1 1/4	4 1/4	2
3/4"	60	2 3/4	1 3/8	4 1/4	2
1"	100	3	1 1/2	4 3/8	2
1 1/4"	180	3 1/2	1 5/8	4 1/2	2



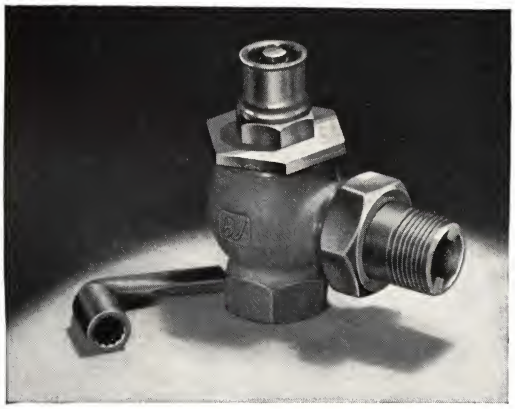
TYPE F PACKLESS QUICK-OPENING VALVES

SIZE	Capacity Sq. Ft. C.I. Rad.	A	B	C	D
1/2"	30	2 3/4	1 1/4	4 5/16	2 1/4
3/4"	60	2 3/4	1 3/8	4 5/16	2 1/4
1"	100	3	1 1/2	4 7/16	2 1/4
1 1/4"	180	3 1/2	1 5/8	4 5/8	2 1/4
1 1/2"	270	3 7/8	2 3/32	6 5/16	3
2"	400	4 5/16	2 15/64	6 7/8	3

Above capacities are based on 2 ounces pressure difference for vapor or vacuum heating systems.



Type F Packless Quick-Opening Valve



B&J Modulation Valve, Lock Shield Model

BARNES & JONES
THERMOSTATIC TRAPS

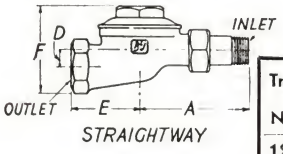
The successful operation of a vapor or vacuum system depends more on the efficiency of the thermostatic traps than any other single factor. They must allow all air and water of condensation to drain away freely at all times, but must close quickly and tightly to prevent the passage of steam into the return side of the system. The new Barnes & Jones return trap, using a thermostatic element contained in a cage, represents the greatest advancement in trap design and construction that has been made in many years.

The cage-unit contains all of the essential parts necessary for the operation of a thermostatic trap. It is a complete operating unit in itself, containing a thermostatic element with valve piece, and carrying its own seat of stainless steel or monel metal.

These cage-units can be used in any Barnes & Jones return trap now installed, and can be supplied to fit almost all other makes of traps.

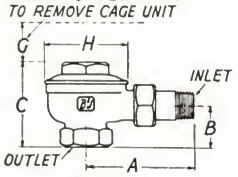
Replacement of Cage

The cage-unit can be replaced easily and quickly by unskilled labor; it is only necessary to lift the old unit out and insert a new one as shown in the illustrations at the right. No special tools are required, no adjustments, no guessing at the correct setting, no seat troubles, no piping to be disconnected—the trap is immediately returned to its original accuracy, sensitiveness and efficiency.



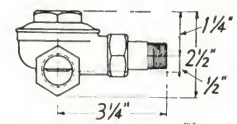
STRAIGHTWAY

CLEARANCE NECESSARY TO REMOVE CAGE UNIT

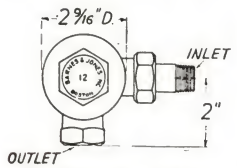


ANGLE

Trap	TAPPING		DIMENSIONS						
No.	Inlet	Outlet	A	B	C	D	E	F	G
120	½"	½"	3¼	1¼	2½	½	2	2½	1½
12	½"	¾"	3¼	1¼	2½	½	2	2½	1½
132	¾"	¾"	3⅜	1⅜	2⅞	⅝	2⅛	2⅞	1¾
123	½"	½"	3⅜	1⅜	2⅞	⅝	2⅛	2⅞	1¾
124	½"	¾"	3⅜	1⅜	2⅞	⅝	2⅛	2⅞	1¾
134	¾"	¾"	3⅜	1⅜	2⅞	⅝	2⅛	2⅞	1¾
13	¾"	¾"	3⅜	1⅜	3	⅝	2⅜	3	2
14	1"	1"	3⅝	1 11/16	3½	¾	2⅜	3½	2

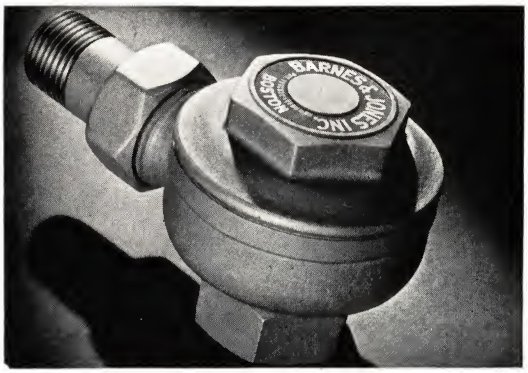


RIGHT HAND CORNER
LEFT HAND CORNER TRAP HAS THE OUTLET ON OPPOSITE SIDE

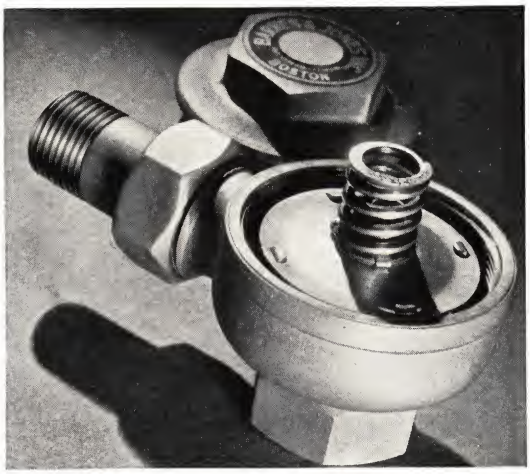


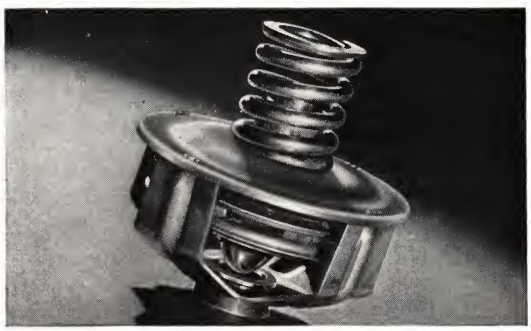
CORNER TRAP MADE IN NO. 120 AND NO. 12 ONLY

Trap	CAPACITIES IN SQUARE FEET E. D. R. PRESSURE DIFFERENTIAL IN POUNDS PER SQ. IN.								
No.	1/16	⅛	¼	½	1	1½	2	3	4
120	56	70	92	120	168	200	228	278	306
12	56	70	92	120	168	200	228	278	306
132	56	70	92	120	168	200	228	278	306
123	92	120	152	208	320	400	450	512	560
124	92	120	152	208	320	400	450	512	560
134	92	120	152	208	320	400	450	512	560
13	176	200	300	430	590	700	760	824	880
14	320	390	520	700	1000	1200	1320	1480	1600



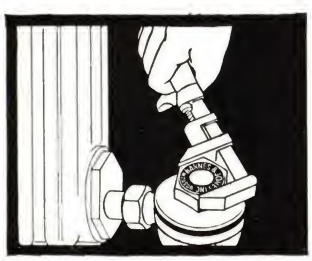
Barnes & Jones Thermostatic Trap

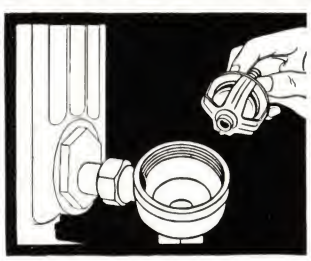

Thermostatic Trap with Cover Removed

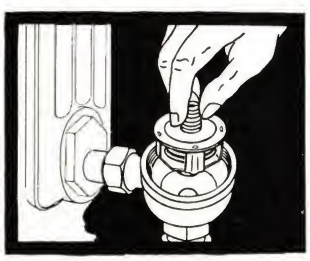

Patented Thermostatic Cage Unit

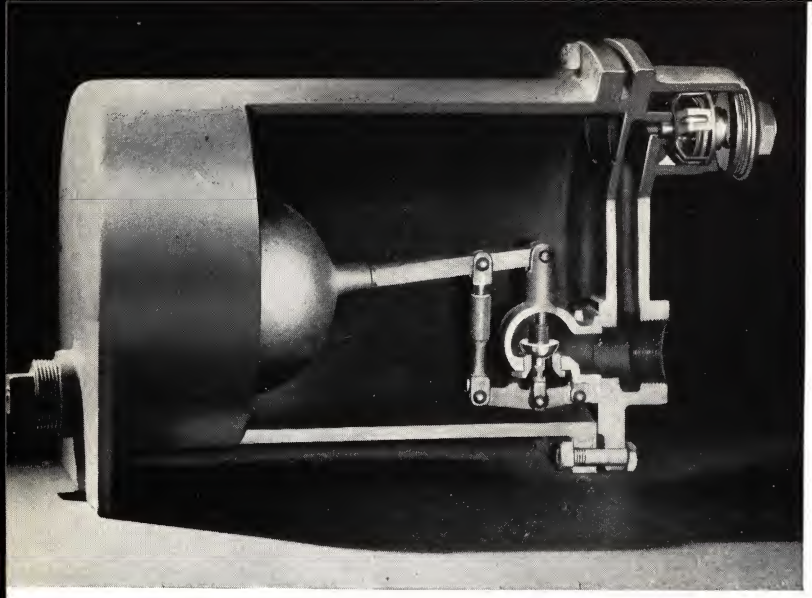
All Traps Tested Before Leaving Factory

Each cage-unit is calibrated and tested at the factory for tightness and opening temperature on our steam testing rack under actual working conditions, then permanently locked in correct adjustment.


Thermostatic element is easily and quickly replaced. No special tools are necessary. Simply remove the cap—


lift out the old element and


replace it with the new cage unit. The trap is returned to its original accuracy and sensitiveness regardless of distance between the cover and seat of trap body.



Sectional Views of the Barnes & Jones Float and Thermostatic Blast Traps
Note clean design and sturdy construction. Cage containing thermostatic element is easily and quickly replaced, if necessary, as described on page 5

BARNES & JONES

FLOAT AND THERMOSTATIC BLAST TRAPS

For Heavy Duty Service in Handling Condensation

These heavy-duty traps are for use at any point where large and sudden condensation loads occur—loads that are greater than can be handled properly by thermostatic traps. They perform all of the functions of ordinary thermostatic traps, and in addition have an air and water capacity large enough to take care of the condensation from all units condensing large quantities of steam at low pressure. A thermostatically controlled air by-pass located in the top section of the trap insures free and rapid elimination of air and prevents the passage of steam. The discharge of the condensate is controlled by a float-operated valve.

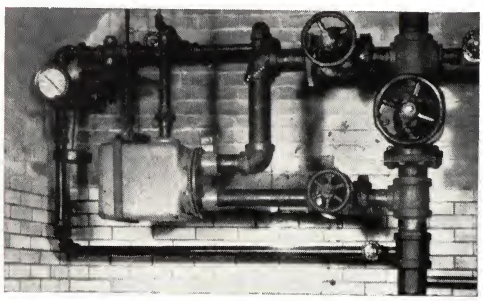
These traps are designed for use on vapor or vacuum systems and should not be used when pressure exists on the discharge side of the trap. They are designed particularly for low-pressure service and are not suitable for pressures above 15-pounds gauge pressure.

In all Barnes & Jones float and thermostatic traps the float-controlled valve governing the discharge of the condensate is always water sealed. The float is unusually large for this type of trap, providing greater leverage (or power) and insuring instant opening of the discharge valve. The air-discharge port is located in the top section of the trap, permitting free and rapid elimination of the air. It is controlled by the patented cage-type thermostatic unit shown in the sectional views below and illustrated and described on page 5 of this bulletin.

These traps are made in five sizes, varying from small, compact units to large, heavy-duty traps of large capacity. See table on opposite page.

No. 43 Trap Dripping the End of a Steam Main
Note ease with which trap may be cleaned

No. 45A Trap Handling the Condensation from a 2500-Gallon Hot Water Heater
This trap has been in satisfactory service since 1928, and has never been taken apart except for cleaning



No. 48A Trap Handling the Returns from 30,740 Sq. Ft. of Radiation on a Barnes & Jones Proportionator System

TRAPS EASILY CLEANED OR RENEWED WHEN NECESSARY

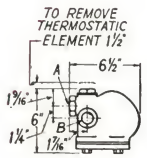
It is frequently necessary to install these traps (particularly the smaller sizes) close to ceilings or walls. Barnes & Jones engineers have kept this factor in mind, and the traps have been designed to make them easy to install and get at for cleaning in such locations. They can be taken apart for cleaning or renewal of worn parts without breaking any pipe connections and without the use of any socket or special wrenches.

IMPORTANCE OF PROPER INSTALLATION

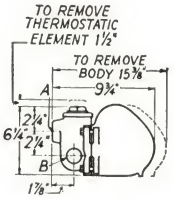
In the installation of any trap of this nature, it is desirable to use a strainer and frequently a gate shut off valve ahead of the trap. Sketch "A" shows a typical connection for dripping the end of a steam main to a vapor or vacuum overhead return main. Note the importance of using an eccentric reducer where the reduction in size is made, as otherwise a pocket will result that will prevent the complete elimination of water from the steam main.

Where a rise in the steam main is to be made, it is well to extend the main full size a short distance beyond the last connection taken off as shown in Sketch "B." Frequently the gate valve, shown in the sketches, ahead of the trap is omitted; as in many cases, if it is necessary to service the trap, the steam pressure can be dropped without causing inconvenience for the brief interval required for servicing.

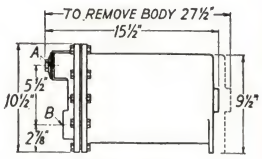
When the steam main is to be dripped to a non-pressure wet return, it is necessary to vent the discharge side of the trap to the overhead dry return or air line. This may be accomplished by using the other outlet of the trap or, if more convenient, by installing a tee in place of the elbow shown in Sketch "C" dropping to the wet return, and connecting the air line to this point. In any drip connection, if a strainer is not used, a dirt pocket should be installed.



NO. 41, 42



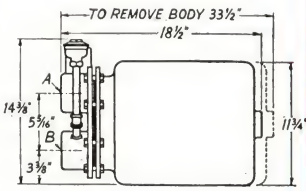
NO. 43



NO. 45A

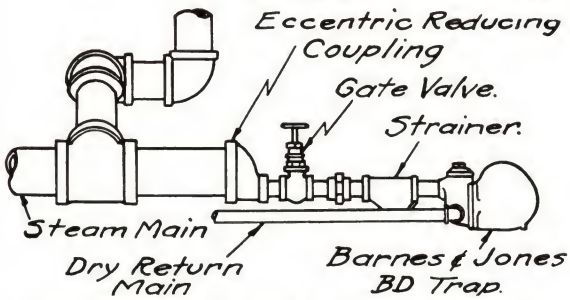
No.	Capacity Lbs. Water Per Hour	Net Weight	Tappings A Inlet	Tappings B Out-let	Width Maximum
41	200	9	¾"	¾"	4"
42	700	9	1"	1"	4"
43	1200	15	1¼"	1¼"	4½"
45A	2400	65	1½"	1½"	10½"
48A	5000	107	2"	2"	10¾"

Above capacities based on 2-pound pressure differential.



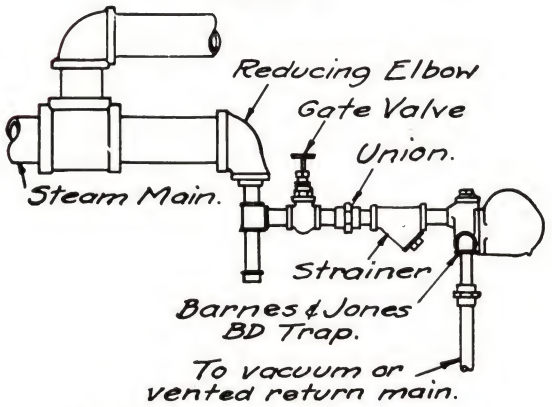
NO. 48A

SKETCH A



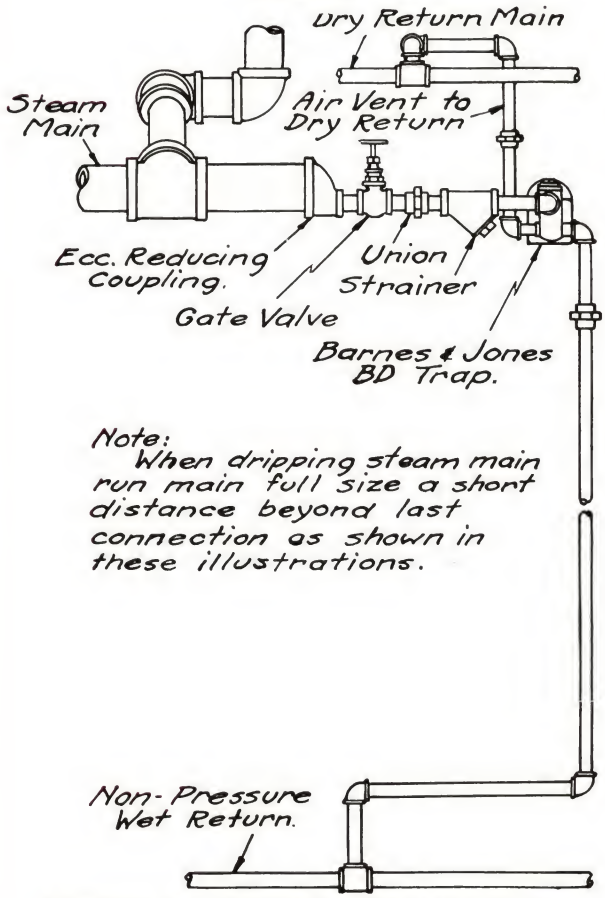
METHOD OF DRIPPING STEAM MAIN TO OVERHEAD VACUUM OR VENTED RETURN MAIN

SKETCH B

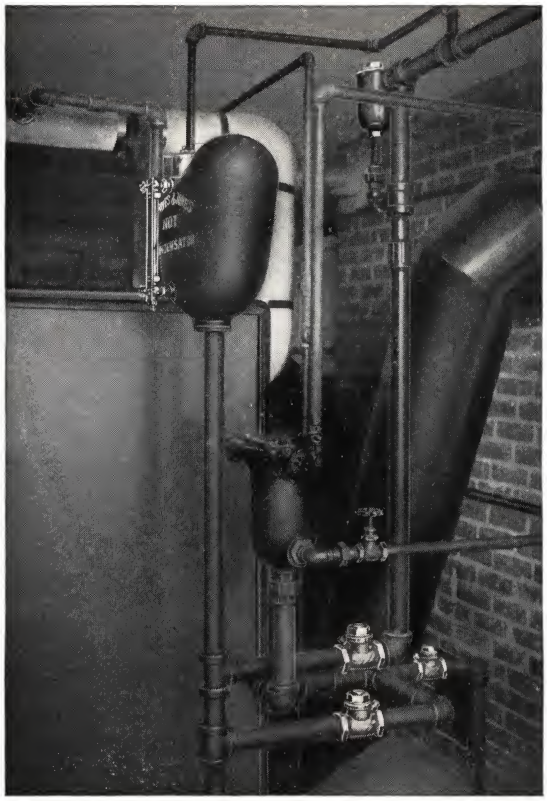


METHOD OF DRIPPING RISE IN STEAM MAIN

SKETCH C



METHOD OF DRIPPING STEAM MAIN TO NON-PRESSURE WET RETURN



A Typical Installation of a Barnes & Jones Condensator
Showing the vent trap in its proper position

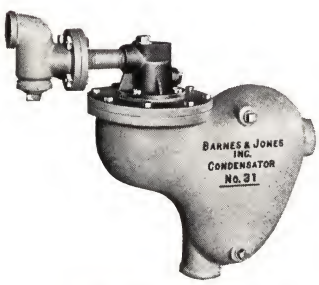
An Installation of a Larger Condensator
Note again how the condensator is vented into the dry return main, thence to the atmosphere through the vent trap

BARNES & JONES CONDENSATORS

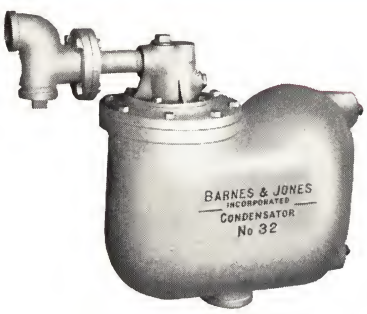
For Vapor Systems Assure Positive Return of Condensation to Boiler

The Barnes & Jones Condensator, or boiler return trap, is a safety device necessary on vapor systems to prevent damage to the boiler occurring if the steam pressure is raised above a few ounces. Its fundamental purpose is to return the water of condensation to the boiler independently of the boiler pressure. It should be clearly understood that this is accomplished without any change in the operating conditions of the system and without air-binding or admitting steam to the return side of the system. The Condensator is installed near the boiler as high above the water line as possible. The water of condensation flows into the condensator and rising, causes the steam valve to open, thus equalizing the pressure in the boiler and the condensator, and allowing the water that has collected in the condensator to return to the boiler by gravity.

The Condensator is simple in construction and its operation is positive at all times. Its few movable parts are wholly enclosed to prevent any tampering. The connections are large to eliminate friction and insure an easy and sensitive apparatus under all conditions. All working parts are of the best bronze metal.



Condensator No. 31



Condensator No. 32

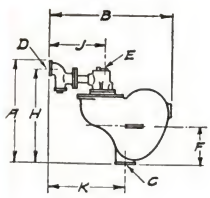
Condensator No. 33-37, Inclusive

Vent Trap

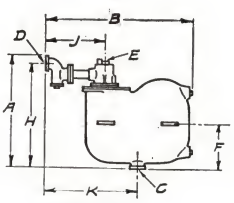
The two illustrations on the opposite page and the diagrams below show most clearly the proper methods of installing Barnes & Jones condensators. It will be noted in the illustrations that the condensator is so installed that the water of condensation comes back through a dry return main which, when near the boiler, drops and becomes wet. At the point where it drops, a Barnes & Jones vent trap is installed to allow the discharge of air from the radiators and the condensator.

After the return main becomes wet, the water of condensation passes through a check valve before it reaches the connection to the Condensator, and thence through another check valve installed in the return main between the connection to the Condensator and the boiler.

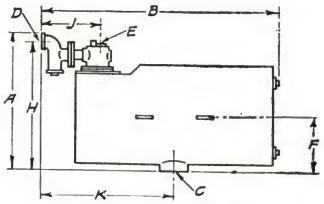
It will be noted in the illustrations that the drips from the supply mains and risers are brought back through a separate wet drip line. Where this is done, care must be taken to see that this wet drip line is connected to the boiler independently or is connected into the return main between the boiler and the inside check valve. A check valve must be installed in the wet drip line also. Steam main may be dripped through traps and separate wet drip main omitted if desired.



No. 31



No. 32



Nos. 33, 34, 35, 36, 37

C—Size of connection to Return Main.

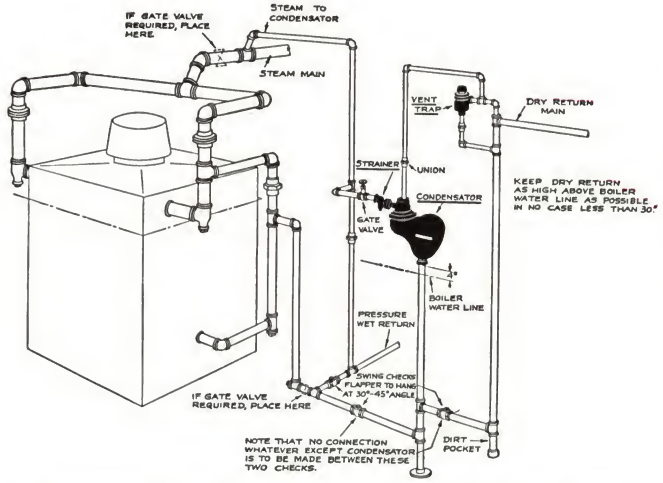
D—Size of steam connection.

E—Size of vent connection

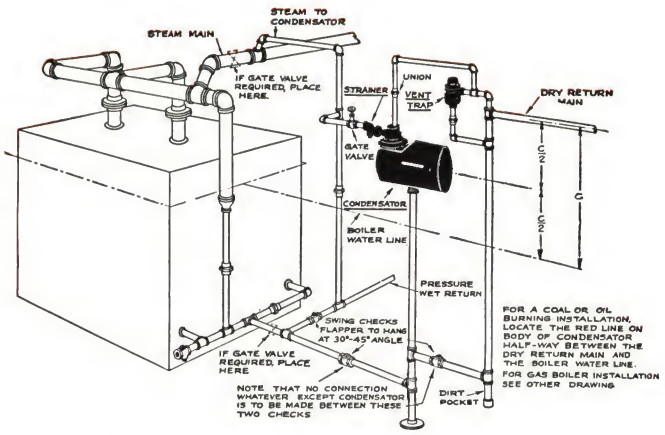
G—Maximum width

Note: Water gauge glass and cock extra.

No.	A	B	C	D	E	F	G	H	J	K	Cap. sq. ft. of Cl. Radiation	Net Wt.	Ship. Wt.
31	18⅜	22¼	1½	1¼	¾	7⅛	8½	17¼	10⅜	14¼	700	60	80
32	18⅜	23	1½	1¼	¾	7⅛	8½	17¼	10⅜	14¼	1600	75	110
33	19	24	2	1¼	¾	8	14	17⅞	10⅜	13¾	3500	100	140
34	21	26	2	1¼	¾	8⅞	15½	19⅞	10⅞	15⅜	6000	110	150
35	25	30	4	1½	¾	10½	18	23¾	11½	17	10000	170	220
36	25	40	4	1½	¾	10½	18	23¾	11½	23	16000	200	275
37	30	51	4	2	¾	13½	24	28	19	32	32000	275	375



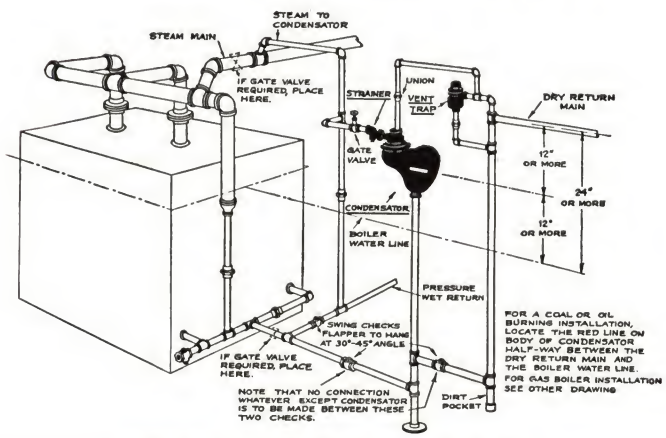
Method of Connecting No. 31 Condensator to Gas Fired Boiler



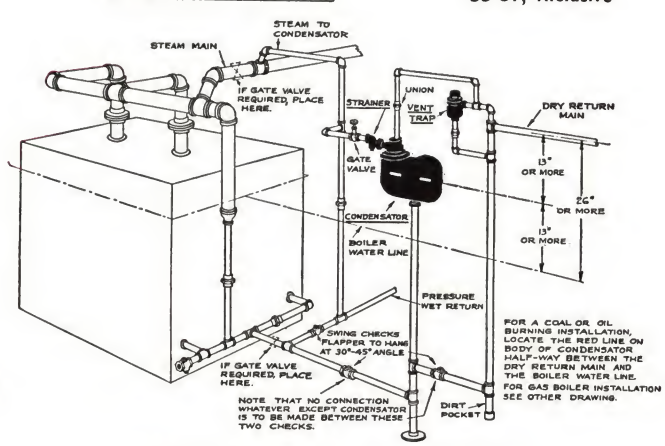
MINIMUM DIMENSION "C" FOR VARIOUS SIZE CONDENSATORS

SIZE	33	34	35	36	37
DIMENSION "C"	30"	32"	36"	42"	48"

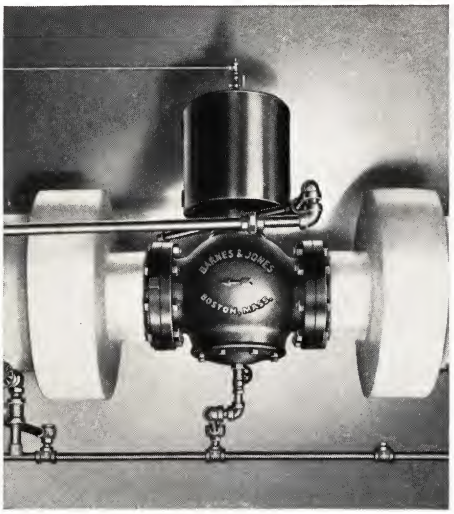
Method of Connecting Condensators Nos. 33-37, Inclusive



Method of Connecting No. 31 Condensator



Method of Connecting No. 32 Condensator



Proportionator Valve Controlling the Steam Admitted to a Zone in an Office Building

BARNES & JONES PROPORTIONATOR SYSTEM

An Efficient Method of Controlling Heat Distribution in New or Old Heating Systems

The Barnes & Jones Proportionator System provides zone heating that is extremely simple in principle, requires no complicated electrical devices and can be installed without extensive changes of piping in buildings already equipped with vapor or vacuum heating. It is particularly adapted for large buildings that buy or generate their own steam and makes possible real savings in fuel costs.

Despite the rapid increase in use of equipment and appliances for more efficient generation of heat, very little attention has been paid to control of heat where its waste is most flagrant, and almost no attention has been given to control of the rate of flow of heat to points where it is used. A large portion of the average building is usually much more overheated than underheated. In heating a portion that does not benefit by the sun's rays or is in the face of a cold wind, other parts of building become overheated. This causes much waste. To remedy this situation, a new system of control was needed which would supply heat **when** it is needed, **where** it is needed, and **in proportion** to that need.

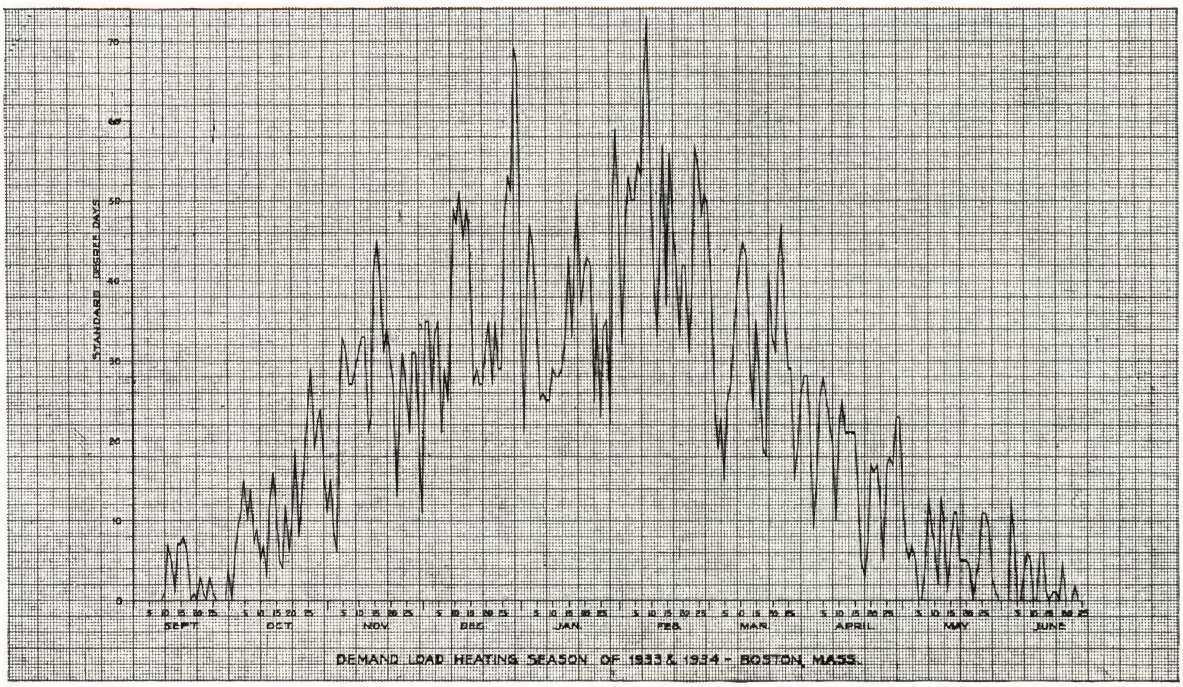
HEAT DELIVERED ONLY WHEN AND WHERE AND IN PROPORTIONS NEEDED

The Barnes & Jones Proportionator System provides this control. It allows flexible operation so that only enough steam is supplied the radiators to furnish heat to building to balance heat loss for any outside temperature condition. Thus, if only a small amount of heat is necessary, a slight turn of a pointer on the control panel will uniformly distribute a very small quantity of steam throughout the system.

The Barnes & Jones Proportionator System controls the rate of flow of steam so that each section of building gets heat in proportion to its need, regardless of amount of heat required elsewhere. This keeps all parts of the building at a comfortable temperature, eliminates complaints, conserves fuel, and saves money. These results are accomplished without complicated control apparatus or piping.

CHART SHOWING VARIATION IN DEMAND LOAD DURING A TYPICAL HEATING SEASON

The chart shows how demand load varies during the heating season. Note the wide variations. Exposures of various sides of building to prevailing winds, the sun, occupancy, etc., are important factors affecting heat losses. A new system can be designed to give maximum flexibility in control. An old system, while the piping may not be ideally arranged, can be vastly improved and material economies effected.



CONTROLS FOR THE SYSTEM

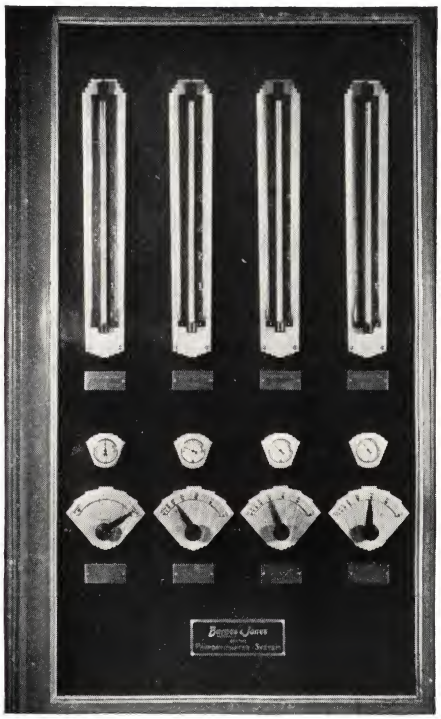
ZONING THE BUILDING

In applying the Proportionator System, the first step is to study the layout of the building and divide it into sections or zones, according to the heat requirements. The number, size, and location of the zones will be governed by the height of the building, exposure, prevailing winds, types of occupant, use during occupancy. Many buildings and most homes need only to be divided into two zones, but where conditions require it, six, eight, and sometimes ten zones are not unusual.

The sole purpose of the apparatus is to provide the necessary amount of steam to any part of the building to balance the heat loss from that part of the building. It thus prevents overheating and provides more comfortable conditions for the occupants. The elimination of overheating naturally results in a material saving of steam which rapidly absorbs the cost of the equipment.

CONTROL BOARD

In a typical installation a control board is located at some convenient point, preferably in the superintendent's or chief engineer's office. If desired, a remote reading thermometer installed on the control panel makes it possible to ascertain the temperature in any zone at any time.

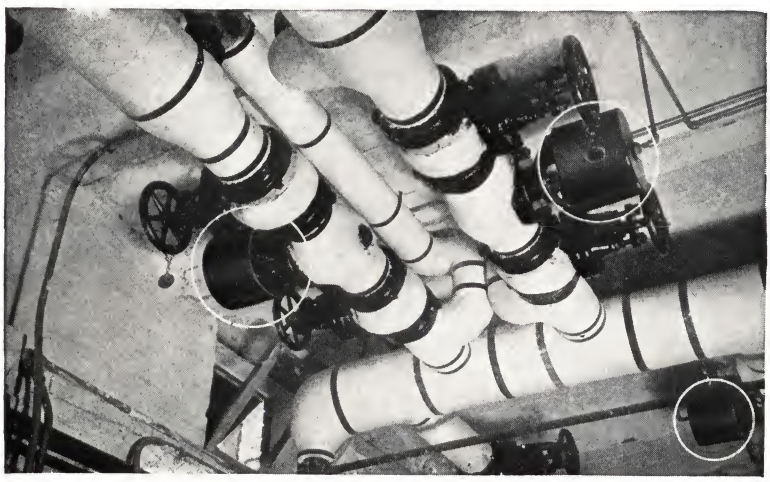


A Typical Control Board for Barnes & Jones Proportionator System

THE PROPORTIONATOR VALVES

A proportionator valve is installed in each supply line which feeds the zone, and when used in conjunction with the control, supplies steam to the zone when it is needed and in proportion to that need.

The photograph at the right shows a view of the boiler room piping of a building equipped with a Barnes & Jones Proportionator System. Note the proportionator valves in the steam mains supplying the different zones of the building.



MODULATION OR PACKLESS QUICK OPENING VALVES AND RADIATOR TRAPS

Each radiator should have a Barnes & Jones Type "K" or Type "F" valve on the supply and a Barnes & Jones thermostatic trap on the return. A Barnes & Jones orifice carefully proportioned for proper results is installed in the union connection of each supply valve. The function of the orifice is to equalize distribution of the steam, and to make possible a variation in the amount of each radiator heated, by a change in steam pressure. This feature in itself is of great value in the operation of any heating system.

A PROPORTIONATOR SYSTEM FOR NEW OR OLD BUILDINGS

The problem of arranging the piping for a new installation is simple and the proper layout can usually be accomplished with little or no additional cost over an ordinary system. We wish to emphasize the fact, however, that the Barnes & Jones Proportionator System is just as applicable to a building already built as for a new building. Due to obsolescence of equipment, and lack of any means of control it is of great importance to modernize existing systems. Modernizing present plants can usually be accomplished at small expense, and results in not only a fuel saving, but also in greater comfort for the tenants. One of our recent modernizing installations in an office building of over a thousand radiators resulted in a fuel saving which paid over half the cost of the entire modernization work the first year.

BARNES & JONES, INC.

FACTORY AND MAIN OFFICE
128 BROOKSIDE AVENUE (Jamaica Plain)
BOSTON, MASSACHUSETTS

Branch Offices or Representatives in All Principal Cities

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